04.25.05

AF/1722

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re the Application of:
Karl W. Beeson, et al.

Docket No.: 30-3818 DIV2 (4370)

Serial No.: 09/808,796

Group Art Unit: 1722

Filed: March 15, 2001

Examiner: Emmanuel S. Luk

For: OPTICAL STRUCTURES FOR DIFFUSING LIGHT

APPEAL BRIEF FOR APPELLANT

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

This is an Appeal to the Board of Patent Appeals and Interferences from the Final Rejection of claims 22-30, 35-38, 42, and 57-67 mailed December 1, 2004 in the above identified case. A Notice of Appeal was filed on February 28, 2005. An oral hearing is not requested.

The Commissioner is authorized to charge the required appeal brief fee of $500.00 to Deposit Acct. No. 01-1125. In the event that the Commissioner determines that an additional extension of time is required in order for this submission to be timely, it is requested that this submission include a petition for an additional extension for the required length of time and the Commissioner is authorized to charge any other fees necessitated by this paper to Deposit Acct. No. 01-1125.

TABLE OF CONTENTS

I. REAL PARTY IN INTEREST

The real party in interest is Honeywell International, Inc.

II. RELATED APPEALS AND INTERFERENCES

With respect to other appeals or interferences that will directly affect, or be directly affected by, or have a bearing on the Board's decision in this appeal, please note that there are no other related applications on appeal or subject to an interference known to appellant, appellant's legal representative or the assignee.

III. STATUS OF CLAIMS

The claims in the application are 1-68. Claims 22-30, 35-38, 42, and 57-67 are pending, stand rejected and are on appeal. Claims 1-21 and 34, 39-41, 43-56, 68 have been withdrawn from consideration. No claims are allowed.

IV. STATUS OF AMENDMENTS

No response was filed after the final rejection of December 1, 2004.

V. SUMMARY OF THE CLAIMED SUBJECT MATTER

(a) The present invention relates to an apparatus for manufacturing a light diffusing structure, in claim 22. The features of this embodiment are supported throughout the specification. The apparatus comprises a transparent or translucent substrate; a layer of photopolymerizable material; means for directing collimated or nearly-collimated light through the substrate and into the photopolymerizable material for a period of time sufficient to photopolymerize only a portion of the photopolymerizable material; and an array of tapered optical waveguides positioned between the substrate and the means for directing light. Each tapered optical waveguide comprises an input surface that admits

light; an output surface distal from the input surface, the output surface having a surface area less than that of the input surface; and a sidewall or sidewalls disposed between the input and output surfaces for effecting total reflection of the light rays received by the input surface.

Claim 23 further limits this embodiment by requiring that substrate is fabricated from a material from one or more of the classes of (a) amorphous materials; (b) semi-crystalline materials that contain crystalline domains interspersed in an amorphous matrix; and (c) purely crystalline materials. Support for this embodiment can be found on page 4, lines 20-23 of the specification.

Claims 24-26 further limit the embodiment of claim 22 by setting parameters for the photopolymerizable material. Support for these limitations can be found on page 5 line 7 through page 6 line 30. Claims 27-28 further limit claim 22 by setting parameters for the light source. Support for these limitations can be found on page 4 lines 1-5 and page 9 lines 8-10 of the specification.

Claims 29-30 further limit claim 22 by respectively requiring a means for removing the unphotopolymerized portion of the photopolymerizable material, and a means for removing the photopolymerized portion of the photopolymerizable material from the substrate. Support for these embodiments can be found on page 8 lines 9-19.

Claims 31-33 further limit claim 22 by setting parameters for a fill material on the surface of the photopolymerized photopolymerizable material. Support for these requirements can be found in the specification on page 10 line 12 through page 11 line 16, and after.

Claim 35 further limits claim 22 by requiring that the photopolymerized photopolymerizable material is in juxtaposition to the input or the output surface of the tapered optical waveguides. Support for this embodiment can be found in the specification on page 12 line 25 and after.

Claim 36 further limits claim 22 by requiring that the tapered optical waveguides are lenticular. This feature is described on page 14 lines 11-13 of the specification.

Claim 37 provides an embodiment of claim 22 which further requiring means for removing the unphotopolymerized portion of the photopolymerizable material; means for forming a metallic layer on the surface of the photopolymerized photopolymerizable material to form a conforming replica layer; and means for applying the metallic replica layer to embossable material. Claim 38 further limits claim 37 by requiring that the embossable material contains light-scattering particles. Support for these embodiments can be found on page 9 line 16 through page 10 line 11, and page 10 line 29 through page 11 line 6.

Claim 22 is further limited by claim 65, which requires that the photopolymerized portion has a surface having smooth bumps ranging from about 1 micron to about 20 microns in both height and width. Support for this feature is shown on page 8 lines 21-23.

(b) The invention further includes an apparatus for manufacturing a light diffusing structure as shown in claim 42. The features of this embodiment are supported throughout the specification. The apparatus of this embodiment includes a transparent or translucent substrate fabricated from a material from one or more of the classes of (a) amorphous materials; (b) semi-crystalline materials that contain crystalline domains interspersed in an amorphous matrix; and (c) purely crystalline materials. Support for this feature can be found on page 4, lines 20-23 of the specification. The substrate has first and second surfaces which are generally flat and parallel to each other; a layer of photopolymerizable material, comprising at least one photopolymerizable monomer or oligomer, a photoinitiator and a photoinhibitor, deposited on the first surface of the substrate; a light source for directing collimated or nearly-collimated light through the second surface of the substrate and into the photopolymerizable material for a period of time sufficient to photopolymerize only a portion of the photopolymerizable material; a

means for removing the unphotopolymerized portion of the photopolymerizable material; and an array of tapered optical waveguides positioned between the substrate and the light source. Each tapered optical waveguide comprises an input surface that admits light; an output surface distal from the input surface, the output surface having a surface area less than that of the input surface; and a sidewall or sidewalls disposed between the input and output surfaces for effecting total reflection of the light rays received by the input surface.

Claim 66 further limits this embodiment by requiring that the photopolymerized portion has a surface having smooth bumps ranging from about 1 micron to about 20 microns in both height and width. This embodiment is described in the specification on page 8 lines 21-23.

(c) An additional embodiment of the invention, shown in claim 57, includes an apparatus for manufacturing a light diffusing structure, comprising a metallic layer formed on a layer of photopolymerizable material, which photopolymerizable material is positioned on a transparent or translucent substrate and exposed to a source of collimated or nearly-collimated light. This light is first directed through the transparent or translucent substrate for a period of time sufficient to photopolymerize only a portion of the photopolymerizable material after the unphotopolymerized portion of the photopolymerizable portion has been removed. The apparatus further includes an array of tapered optical waveguides positioned between the substrate and the light source. Each tapered optical waveguide comprises an input surface that admits light; an output surface distal from the input surface, the output surface having a surface area less than that of the input surface; and a sidewall or sidewalls disposed between the input and output surfaces for effecting total reflection of the light rays received by the input surface. Support for these features of claim 57 can be found throughout the specification.

Claim 58 further limits this embodiment by requiring that the substrate is fabricated from a material from one or more of the classes of (a) amorphous materials; (b) semi-crystalline materials that contain crystalline domains interspersed in an amorphous

matrix; and (c) purely crystalline materials. Support for this embodiment can be found on page Support for this embodiment can be found on page 4, lines 20-23 of the specification.

Claims 59-61 further limit the embodiment of claim 57 by setting parameters for the photopolymerizable material. Support for these limitations can be found on page 5 line 7 through page 6 line 30. Claims 62-63 further limit claim 57 by setting parameters for the light source. Support for these limitations can be found on page 4 lines 1-5 and page 9 lines 8-10 of the specification.

(d) The invention further relates to a mold for manufacturing a light diffusing structure, as shown in claim 64. This mold comprises a metallic layer formed on a layer of photopolymerizable material which is positioned on a transparent or translucent substrate, said photopolymerizable material comprising at least one photopolymerizable monomer or oligomer, a photoinitiator and a photoinhibitor, which photopolymerizable material has been exposed to a source of collimated or nearly-collimated light first directed through the transparent or translucent substrate. Support for these features can be found throughout the specification. The substrate is fabricated from a material from one or more of the classes of (a) amorphous materials; (b) semi-crystalline materials that contain crystalline domains interspersed in an amorphous matrix; and (c) purely crystalline materials, for a period of time sufficient to photopolymerize only a portion of the photopolymerizable material after the unphotopolymerized portion of the photopolymerizable portion has been removed. Support for this feature can be found on page 4, lines 20-23 of the specification. The photopolymerized portion has a surface having smooth bumps ranging from about 1 micron to about 20 microns in both height and width. This feature is supported in the specification on page 8 lines 21-23.

Claim 67 further limits this embodiment by requiring that the photopolymerized portion has a surface having smooth bumps ranging from about 1 micron to about 20 microns in both height and width. Such is disclosed in the specification on page 8 lines 21-23.

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

(a) Claims 22-30, 35, 36, and 42 stand rejected under 35 U.S.C. 103 over Takahashi in view of Rendulic and in further view of Beeson.

(b) Claims 57-63 stand rejected under 35 U.S.C. 103 over Takahashi in view of Rendulic and in further view of Beeson.

(c) Claim 67 stands rejected under 35 U.S.C. 103 over Takahashi in view of Rendulic and Beeson, and in further view of Jarsen.

(d) Claim 64 stands rejected under 35 U.S.C. 103 over Takahashi in view of Rendulic and in further view of Jarsen.

(e) Claims 22-30, 35, 36, and 42 stand rejected under 35 U.S.C. 103 over Matsumara in view of Rendulic and in further view of Beeson.

(f) Claim 66 stands rejected under 35 U.S.C. 103 over Matsumara in view of Rendulic and Beeson, and in further view of Jarson.

(g) Claims 31-33, 37-38, and 65 stand rejected under 35 U.S.C. 103 over Matsumara in view of Rendulic and Jarson, and in further view of Beeson.

VII. ARGUMENTS

(a) The Examiner has rejected claims 22-30, 35, 36, and 42 under 35 U.S.C. 103 as being unpatentable over Takahashi in view of Rendulic and in further view of Beeson. Appellants respectfully submit that this ground of rejection is not well taken.

The present invention relates to an apparatus for manufacturing a light diffusing structure, comprising: a transparent or translucent substrate; a layer of photopolymerizable material; and means for directing collimated or nearly-collimated light through the substrate and into the photopolymerizable material for a period of time sufficient to photopolymerize only a portion of the photopolymerizable material; and an array of tapered optical waveguides, each tapered optical waveguide comprising: an input surface that admits light; an output surface distal from the input surface, the output surface having a surface area less than that of the input surface; and a sidewall or sidewalls disposed between the input and output surfaces for effecting total reflection of the light rays received by the input surface.

The examiner is of the position that Takahashi teaches all but a few key features of the present invention. Appellants submit that this is not the case. Takahashi relates to the formation of photosensitive resin compositions for the production of relief printing plates. Appellants urge that one skilled in the art would not look to Takahashi, a reference relating to the formation of photosensitive resins for relief printing plates, in an effort to devise the presently claimed invention, relating to optical light diffusers.

While Takahashi does indeed teach the curing of a resin composition on a glass plate, it fails to teach the *structure* of the presently claimed invention. The present invention teaches an apparatus for manufacturing a *light diffusing structure* wherein only a portion of the photopolymerizable material is polymerized. Thus, a non-uniform photopolymerized layer is formed, which thereby causes the diffusion of light when directing light onto the layer. Takahashi does not teach a light diffusing structure, but

rather a structure having a masked and exposed resin pattern formed thereon. Takahashi states in col. 15, line 66 through col. 16 line 2, that their structure serves to "produce a printing plate having uniform thickness and which is *free from dents and bumps*." It is further urged that nowhere does Takahashi even mention the words "diffuse" or "diffusion". It is respectfully urged that the structure taught by Takahashi would *not* serve as a light diffuser, and that Takahashi thus teaches away from the presently claimed invention.

The examiner concedes that Takahashi fails to teach several key features of the present claims. For example, Takahashi fails to teach a collimated light source. Takahashi further fails to teach the presently claimed means for directing light generates light having a divergence angle of less than ten degrees. In addition, Takahashi fails to teach an embodiment wherein the presently claimed means for directing light directs the light through the substrate in more than one dose.

The examiner thus cites Rendulic in an effort to fill these deficiencies of Takahashi. Appellants respectfully submit that such a combination is flawed. Rendulic relates to printed circuit boards. More particularly, it teaches a printed circuit board having polymers coated and cured thereon. Indeed, Rendulic teaches the use of a collimated light source with an angle of deviation between 3 and 1.5 degrees. However, their teachings relate to the formation of printed circuit boards on circuit board substrates. Rendulic does not disclose the use of a transparent or translucent substrate, and, in fact, nowhere does Rendulic even mention the words "diffuse" or "diffusion".

It is urged that the combination of Takahashi and Rendulic still fails to teach the presently claimed array of tapered optical waveguides positioned between the substrate and the light directing means or light source. Each tapered optical waveguide of the claims comprises an input surface that admits light; an output surface distal from the input surface, the output surface having a surface area less than that of the input surface; and a sidewall or sidewalls disposed between the input and output surfaces for effecting total

reflection of the light rays received by the input surface. Such is not taught by Takahashi or Rendulic.

The Examiner attempts to show such optical waveguides by citing Beeson. Appellants respectfully disagree with this combination. While Beeson does relate to optical waveguides and a method for forming such waveguides in general, this reference *does not* teach or suggest such waveguides in combination with the structures of Takahashi and Rendulic. Takahashi relates to relief printing plates, and Rendulic relates to printed circuit boards. In contrast, Beeson relates to a backlighting apparatus, which is not within the same field of art as the other cited references. The examiner attempts to argue that Takahashi and Rendulic should be considered as being in the same field of art as Beeson, to support his assertion that positioning the optical waveguides of Beeson in relation to the substrates as done according to the present invention would have been obvious. Appellants strongly disagree, and urge that the examiner is impermissibly reconstructing the art in light of the present disclosure. Citing references that merely indicate that isolated elements recited in the claims are known is not a sufficient basis for a conclusion of obviousness; there must be something that suggests the desirability of combining the references in a manner calculated to arrive at the claimed invention. Ex parte Hiyamizu, 10 U.S.P.Q.2d 1393, 1394 (PTO Bd. Pat. Ap. and Int., 1988). Neither Takahashi nor Rendulic discuss to light diffusion, or even mention the words "diffuse" or "diffusion". Appellants submit that the Examiner has failed to show any suggestion or motivation in the art to combine the teachings of Takashashi and Rendulic with the Beeson reference, which exists in a very different field of art. It is therefore respectfully urged that the 35 U.S.C. 103 rejection is improper and should be overruled.

(b) The Examiner rejects claims 57-63 under 35 U.S.C. 103 as being unpatentable over Takahashi in view of Rendulic and in further view of Beeson. Appellants respectfully urge that this ground of rejection is not well taken.

The embodiment of these claims involves an apparatus for manufacturing a light diffusing structure, comprising a metallic layer formed on a layer of photopolymerizable material which photopolymerizable material is positioned on a transparent or translucent substrate and exposed to a source of collimated or nearly-collimated light first directed through the transparent or translucent substrate for a period of time sufficient to photopolymerize only a portion of the photopolymerizable material after the unphotopolymerized portion of the photopolymerizable portion has been removed; and an array of tapered optical waveguides positioned between the substrate and the light source. Each tapered optical waveguide comprises an input surface that admits light; an output surface distal from the input surface, the output surface having a surface area less than that of the input surface; and a sidewall or sidewalls disposed between the input and output surfaces for effecting total reflection of the light rays received by the input surface.

As stated above, the Examiner is correct that Takahashi teaches *some* features of the present claims. However, as the Examiner concedes, Takahashi fails to teach or suggest several features of the present claims. Takahashi fails to teach a collimated light source, a means for directing light generates light having a divergence angle of less than ten degrees, or an embodiment wherein the means for directing light directs the light through the substrate in more than one dose. Thus, the Examiner cites Rendulic in an effort to fill these deficiencies of Takahashi. Indeed Rendulic teaches the use of a collimated light source with an angle of deviation between 3 and 1.5 degrees. However, as stated above, the combination of Takahashi and Rendulic still fails to teach the presently claimed array of tapered optical waveguides positioned between the substrate and the light directing means or light source.

The Examiner again incorrectly attempts to fill this void by citing Beeson. As stated above, while Beeson does show optical waveguides and a method for forming such waveguides, this reference *does not* teach or suggest such waveguides in combination with the structures of Takahashi and Rendulic. Neither Takahashi nor Rendulic discuss

to light diffusion, or even mention the words "diffuse" or "diffusion". Takahashi relates to relief printing plates, and Rendulic relates to printed circuit boards. In contrast, Beeson relates to a backlighting apparatus, which is not within the same field of art as the other cited references.

Appellants urge that there is nothing in the cited art which would motivate one skilled in the art to combine the teachings of Takashashi and Rendulic with the Beeson reference. These cited references are in different fields of art, and it is submitted that there is no teaching or suggestion in either of these references which would lead one skilled in the art to combine Takahashi, Rendulic, and Beeson in an effort to devise the light diffusing structure of the presently claimed invention. A reference has to offer sufficient motivation for one skilled in the art to achieve the desired result. In the instant case, the motives in the references, as disclosed by the practices therein, are quite different from each other and from those in the instant invention. Appellants therefore submit that the present invention is not made obvious by the combination the Examiner has suggested, and the 35 U.S.C. 103 rejection should be overruled.

(c) The Examiner rejects claim 67 under 35 U.S.C. 103 as being unpatentable over Takahashi in view of Rendulic and Beeson, and in further view of Jarsen. Claim 67 further limits Claim 57 by requiring that the photopolymerized portion has a surface having smooth bumps ranging from about 1 micron to about 20 microns in both height and width.

The arguments over Takahashi et al. , Rendulic et al., and Beeson et al. in regard to Claim 57 are repeated from above and apply equally here.

The examiner cites Jarsen in an effort to fill the voids of the previously cited art. In particular, the examiner states that the combination of Takahashi, Rendulic, and Beeson fails to teach a surface having smooth bumps ranging from about 1 micron to about 20 microns in both height and width. The examiner takes the position that since Jarsen

teaches a mold for creating bumps on a resin surface prior to curing, that it would have been obvious for one skilled in the art to do so. Appellants respectfully urge that this is not the case.

There is no motivation in the art which would inspire one to combine Jarsen with the previously cited references in the first place. It is urged that the subject matter of Jarsen *does not apply to the technical field of this invention.* Jarsen relates to a matrix used to prepare a mold of elastomeric material, for forming articles such as the information layer of a video disc. In contrast, the present invention relates to light diffusing structures including tapered optical waveguides, for use as a component of an LCD display system.

Furthermore, the bumps described according to Jarsen, which are "information bumps" on a surface of a video disc, are described as having a size which is 0.7μm in height and 1μm in width. This actually *teaches away* from the present invention which requires 1-20 microns in both height and width. The examiner states that it would have been obvious for one skilled in the art to modify Jarsen to change the size and depth to those ranges of the present claims. However, it is urged that an invention cannot be deemed unpatentable merely because, in a hindsight attempt to reconstruct the invention, one can find elements of it in the art; it must be shown that the invention as a whole was obvious at the time the invention was made without knowledge of the claimed invention. 35 U.S.C. 103. The Examiner appears to be going to great lengths to locate and try to interrelate references involving separate features of the present invention , but no matter how one applies or combines these references they do not disclose the presently claimed invention or its attained the demonstrated benefits. When selective combination of prior art references is needed to make an invention seem obvious, there must be something in the art to suggest that particular combination other than hindsight gleaned from the invention itself, something to suggest the desirability of the combination. Uniroyal, Inc. v. Rudkin-Wiley Corp., 5 U.S.P.Q.2d 1434, 1438 (CAFC 1988). Such a suggestion is absent in the cited references.

Appellants urge that one skilled in the art would not have been inspired to combine the teachings of Jarsen with those of the previously cited references in an effort to formulate the presently claimed invention. Thus, it is respectfully urged that the 35 U.S.C. 103 rejection be overruled.

(d) The Examiner rejects claim 64 under 35 U.S.C. 103 as being unpatentable over Takahashi in view of Rendulic and in further view of Jarsen. This embodiment of the present invention relates to a mold for manufacturing a light diffusing structure, comprising a metallic layer formed on a layer of a photopolymerizable material, comprising at least one photopolymerizable monomer or oligomer, and a photoinhibitor, exposed to a source of collimated or nearly-collimated light first directed through a transparent or translucent substrate, the substrate being fabricated from a material from one or more of the classes of (a) amorphous materials; (b) semi-crystalline materials that contain crystalline domains interspersed in an amorphous matrix; and (c) purely crystalline materials, for a period of time sufficient to photopolymerize only a portion of the photopolymerizable material after the unphotopolymerized portion of the photopolymerizable portion has been removed.

The Examiner is correct that Takahashi discloses *some* features of the present claims. However it is urged, as the Examiner agrees, that Takahashi fails to teach or suggest the claimed collimated light source, a metal layer, or smooth bumps of 1-20 microns on the surface. The Examiner again cites Rendulic for teaching a collimated light source to fill this void of Takahashi. The examiner further cites Jarsen for teaching smooth bumps ranging in size from 1-20 microns. As stated above, It is urged that the subject matter of Jarsen *does not apply to the technical field of this invention.* Jarsen relates to the formation of elastomeric video discs while the present invention relates to light diffusing structures including tapered optical waveguides. Thus, Appellants urge that one skilled in the art would not have sought to combine these cited references in an effort to formulate the present claims. It is again further urged that this combination still fails to teach or

suggest the presently claimed invention. Thus, it is respectfully asserted that the 35 U.S.C. 103 rejection should be overruled.

(e) The Examiner has rejected claims 22-30, 35, 36, and 42 under 35 U.S.C. 103 as being unpatentable over Matsumara in view of Rendulic and in further view of Beeson. Appellants respectfully submit that this ground of rejection is not correct.

Matsumura relates to a process for producing a multicolor display. The Examiner is correct that Matsumura teaches several features of the present claims, yet fails to teach a collimated light source, an angle of divergence of less than 10 degrees, providing light in more than one dose, and an array of optical waveguides with lenticular elements juxtaposed with polymerizable materials.

The Examiner thus cites Rendulic in an effort to fill the deficiencies of Takahashi. The examiner is correct that Rendulic teaches the use of a collimated light source with an angle of deviation between 3 and 1.5 degrees. However, it is urged that one skilled in the art would not combine Rendulic, which relates to printed circuit boards, with Matsumura, which relates to multicolor displays. These cited references are in different fields of art, and it is submitted that there is no teaching or suggestion in either of these references which would lead one skilled in the art to combine Matsumura and Rendulic in an effort to devise presently claimed invention.

Furthermore, a combination of Matsumura and Rendulic would still fail to teach the presently claimed array of tapered optical waveguides positioned between the substrate and the light directing means or light source. Each tapered optical waveguide comprises an input surface that admits light; an output surface distal from the input surface, the output surface having a surface area less than that of the input surface; and a sidewall or sidewalls disposed between the input and output surfaces for effecting total reflection of the light rays received by the input surface.

The Examiner attempts to fill this void by citing Beeson. As stated above, it is respectfully urged that this is not the case. While Beeson does show optical waveguides and a method for forming such waveguides, this reference *does not* teach or suggest such waveguides *in combination with the structures of Matsumura and Rendulic.*

Citing references that merely indicate that isolated elements recited in the claims are known is not a sufficient basis for a conclusion of obviousness; there must be something that suggests the desirability of combining the references in a manner calculated to arrive at the claimed invention. Ex parte Hiyamizu, 10 U.S.P.Q.2d 1393, 1394 (PTO Bd. Pat. Ap. and Int., 1988). Appellants submit that the Examiner has failed to show any suggestion or motivation in the art to combine the teachings of Matsumura and Rendulic with the Beeson reference. It is therefore urged that the present invention is not made obvious by the combination of Matsumura et al., Rendulic et al., and Beeson et al., and the 35 U.S.C. 103 rejection should be overruled.

(f) Claim 66 has been rejected under 35 U.S.C. 103 as being unpatentable over Matsumara in view of Rendulic and Beeson, and in further view of Jarson. This embodiment of the invention relates to the apparatus of claim 42, wherein said photopolymerized portion has a surface having smooth bumps ranging from about 1 micron to about 20 microns in both height and width.

The arguments over Matsumura et all, Rendulic et al. , Beeson, and Jarsen are repeated from above and apply equally here. It is therefore respectfully urged that the 35 U.S.C. 103 rejection is improper and should be overruled.

(g) Claims 31-33, 37-41, and 65 have all been rejected under 35 U.S.C. 103 as being unpatentable over Matsumara in view of Rendulic and Jarson, and in further view of Beeson. Appellants respectfully urge that this ground of rejection is improper. The arguments against Matsumura, Rendulic, Jarsen, and Beeson are repeated from above. It

is therefore respectfully urged that the 35 U.S.C. 103 rejection is improper and should be overruled.

None of the cited references, taken alone or in combination, teaches or suggests the invention claimed by Appellants. For all the above reasons, claims 22-30, 35-38, 42, and 57-67 are urged to be patentable over the cited references, and the rejections under 35 U.S.C.103 should be overruled.

Respectfully submitted,

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Date: April 22, 2005

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail, postage pre-paid in an envelope addressed to Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on April 22, 2005.

Richard S. Roberts

VIII. CLAIMS APPENDIX

1-21. (WITHDRAWN)

22. An apparatus for manufacturing a light diffusing structure, comprising:
a transparent or translucent substrate;
a layer of photopolymerizable material; and
means for directing collimated or nearly-collimated light through the substrate and into the photopolymerizable material for a period of time sufficient to photopolymerize only a portion of the photopolymerizable material; and
an array of tapered optical waveguides positioned between the substrate and the means for directing light, each tapered optical waveguide comprising:
an input surface that admits light;
an output surface distal from the input surface, the output surface having a surface area less than that of the input surface; and
a sidewall or sidewalls disposed between the input and output surfaces for effecting total reflection of the light rays received by the input surface.

23. An apparatus as set forth in claim 22, where the substrate is fabricated from a material from one or more of the classes of (a) amorphous materials; (b) semi-crystalline materials that contain crystalline domains interspersed in an amorphous matrix; and (c) purely crystalline materials.

24. An apparatus as set forth in claim 22, where the photopolymerizable material is fabricated from at least one photopolymerizable monomer or oligomer.

25. An apparatus as set forth in claim 22, where the photopolymerizable material is fabricated from at least one photopolymerizable monomer or oligomer, a photoinitiator and a photoinhibitor.

26. An apparatus as set forth in claim 22, where the layer of photopolymerizable material

is on the substrate.

27. An apparatus as set forth in claim 22, where the means for directing light generates light having a divergence angle of less than ten degrees.

28. An apparatus as set forth in claim 22, where the means for directing light directs the light through the substrate in more than one dose.

29. An apparatus as set forth in claim 22, further comprising means for removing the unphotopolymerized portion of the photopolymerizable material.

30. An apparatus as set forth in claim 22, further comprising means for removing the photopolymerized portion of the photopolymerizable material from the substrate.

31. An apparatus as set forth in claim 22, further comprising a transparent or translucent fill material on the surface of the photopolymerized photopolymerizable material.

32. An apparatus as set forth in claim 31, where the fill material has an index of refraction less than that of the photopolymerizable material.

33. An apparatus as set forth in claim 31, where the fill material contains light-scattering particles.

34. (WITHDRAWN)

35. An apparatus as set forth in claim 22, where the photopolymerized photopolymerizable material is in juxtaposition to the input or the output surface of the tapered optical waveguides.

36. An apparatus as set forth in claim 22, where the tapered optical waveguides are

lenticular.

37. An apparatus as set forth in claim 22, further comprising:
means for removing the unphotopolymerized portion of the photopolymerizable material;
means for forming a metallic layer on the surface of the photopolymerized photopolymerizable material to form a conforming replica layer; and
means for applying the metallic replica layer to embossable material.

38. An apparatus as set forth in claim 37, where the embossable material contains light-scattering particles.

39-41. (WITHDRAWN)

42. An apparatus for manufacturing a light diffusing structure, comprising:
a transparent or translucent substrate fabricated from a material from one or more of the classes of (a) amorphous materials; (b) semi-crystalline materials that contain crystalline domains interspersed in an amorphous matrix; and (c) purely crystalline materials, the substrate having first and second surfaces generally flat and parallel to each other; a layer of photopolymerizable material, comprising at least one photopolymerizable monomer or oligomer, a photoinitiator and a photoinhibitor, deposited on the first surface of the substrate; a light source for directing collimated or nearly-collimated light through the second surface of the substrate and into the photopolymerizable material for a period of time sufficient to photopolymerize only a portion of the photopolymerizable material; and
means for removing the unphotopolymerized portion of the photopolymerizable material; and
an array of tapered optical waveguides positioned between the substrate and the light source, each tapered optical waveguide comprising:
an input surface that admits light;
an output surface distal from the input surface, the output surface having a surface area less than that of the input surface; and

a sidewall or sidewalls disposed between the input and output surfaces for effecting total reflection of the light rays received by the input surface.

43-56. (WITHDRAWN)

57. An apparatus for manufacturing a light diffusing structure, comprising a metallic layer formed on a layer of photopolymerizable material which photopolymerizable material is positioned on a transparent or translucent substrate and exposed to a source of collimated or nearly-collimated light first directed through the transparent or translucent substrate for a period of time sufficient to photopolymerize only a portion of the photopolymerizable material after the unphotopolymerized portion of the photopolymerizable portion has been removed; and

an array of tapered optical waveguides positioned between the substrate and the light source, each tapered optical waveguide comprising:

an input surface that admits light;

an output surface distal from the input surface, the output surface having a surface area less than that of the input surface; and

a sidewall or sidewalls disposed between the input and output surfaces for effecting total reflection of the light rays received by the input surface.

58. An apparatus as set forth in claim 57, where the substrate is fabricated from a material from one or more of the classes of

(a) amorphous materials;

(b) semi-crystalline materials that contain crystalline domains interspersed in an amorphous matrix; and

(c) purely crystalline materials.

59. An apparatus as set forth in claim 57, where the photopolymerizable material is fabricated from at least one photopolymerizable monomer or oligomer.

60. An apparatus as set forth in claim 57, where the photopolymerizable material is fabricated from at least one photopolymerizable monomer or oligomer, a photoinitiator and a photoinhibitor.

61. An apparatus as set forth in claim 57, where the photopolymerizable material is on the substrate.

62. An apparatus as set forth in claim 57, where the light source generates light having a divergence angle of less than ten degrees.

63. An apparatus as set forth in claim 57, where the light source generates light in more than one dose.

64. A mold for manufacturing a light diffusing structure, comprising a metallic layer formed on a layer of photopolymerizable material which is positioned on a transparent or translucent substrate, said photopolymerizable material comprising at least one photopolymerizable monomer or oligomer, a photoinitiator and a photoinhibitor, which photopolymerizable material has been exposed to a source of collimated or nearly-collimated light first directed through the transparent or translucent substrate, the substrate being fabricated from a material from one or more of the classes of (a) amorphous materials; (b) semi-crystalline materials that contain crystalline domains interspersed in an amorphous matrix; and (c) purely crystalline materials, for a period of time sufficient to photopolymerize only a portion of the photopolymerizable material after the unphotopolymerized portion of the photopolymerizable portion has been removed; and
wherein said photopolymerized portion has a surface having smooth bumps ranging from about 1 micron to about 20 microns in both height and width.

65. The apparatus of claim 22, wherein said photopolymerized portion has a surface having smooth bumps ranging from about 1 micron to about 20 microns in both height and width.

66. The apparatus of claim 42, wherein said photopolymerized portion has a surface having smooth bumps ranging from about 1 micron to about 20 microns in both height and width.

67. The apparatus of claim 57, wherein said photopolymerized portion has a surface having smooth bumps ranging from about 1 micron to about 20 microns in both height and width.

68. (WITHDRAWN)

IX. EVIDENCE APPENDIX

None.

X. RELATED PROCEEDINGS APPENDIX

None.